

# MONTHLY WEATHER REVIEW,

OCTOBER, 1876.

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

## INTRODUCTION.

In compiling the present Review, the usual data have been made use of. The most noticeable features of the month are; the hurricane of the 17th to 23rd; lower temperatures in the districts east of the Rocky Mountains; large excess of rain-fall in some districts and large deficiencies in others; low water in the rivers.

## BAROMETRIC PRESSURE.

*In General.*—The general distribution of the atmospheric pressure is represented upon chart No. II. The highest reading for the month, 30.64 in., occurred at Yankton, night of the 14th, during the advance of high pressure No. IV; lowest, 28.73 in., at Key West, evening of 19th, while the hurricane was passing over. The pressure averages lower in all the districts than for October, 1873, 1874 and 1875.

*Ranges in Barometer.*—San Diego, .29 in.; Portland, Or., 1.01; Rocky Mountain stations, .48 to .64; plains of Kansas and Nebraska, 1.15 to 1.23; Missouri valley, 1.31 to 1.59; Red River of the North valley, 1.51 to 1.66; Upper Mississippi valley, 1.08 to 1.43; Upper Lake region, .99 to 1.47; Lower Lake region, .91 to 1.09; Ohio valley and Tennessee, .79 to 1.02; New England, .87 to .96; Middle Atlantic States, .80 to .91; South Atlantic States, .72 to .90; Key West, 1.24; Gulf States, .63 to .77; northern Texas and Indian Territory, .84 to 1.06.

*Areas of High Pressure.*—Of these, eight are described below. They have generally appeared in the Upper Missouri valley, from whence their movements have been south and eastward across the country. Their advance has been frequently marked by high northerly winds and gales, especially when preceded by decided low-pressure areas, in the more northern districts and on the Texas coast. As in the case of the storm of the 14th and 15th, when rainy weather has preceded them, the fall in the temperature has been sufficient to turn the rain into sleet and snow, while frequent and heavy frosts have been produced.

No. I.—In the September Review this high-pressure area is described as No. VI. At 7:35 a. m., (Washington time,) of the 1st, the highest, above 30.40 in., was central in Texas, with diminishing northerly winds on that coast, and minimum temperatures of 22° at Breckenridge and Dodge City, 36° at Knoxville and 41° at Corsicana. Frosts occurred as far southward as Indian Ter., northern La., Ga. and Va., and western Pa., with ice in Kan. and Tenn. On the morning of the 2nd it was central in the Western Gulf States, with minimum temperatures slightly above 40° over the interior of the Gulf and South Atlantic States, heavy frosts to the interior of the Gulf and Atlantic States, and ice in northern Ga. and S. C. By morning of the 3rd, the highest, about 30.17, was in the Eastern Gulf States. In northern New Eng., and from central Fla. northward over eastern Ky. and the interior of the South Atl. and Mid. States, the minimum was below 40°, with frequent frosts. During the 3rd and 4th it was gradually dissipated under the influence of low pressure No. I. On the morning of the latter, the area in which the minimum fell below 40°, extended from Wyoming and Nebraska to the Upper Lakes. Frosts were occasionally reported from Ga. and North Car. to New York, and from Ohio to Neb. On the 5th, frosts occurred from Kan. to Ind. and northward, and the area of freezing temperature was confined to northern Mich., Wis., Minn. and eastern Dakota.

No. II.—Following low pressure No. II, it was felt in the Mo. valley on the 5th. The temperature fell below freezing during the night in Wyoming and northern Dakota. At 7:35 a. m., of the 7th, it was central in Mo. and Ark. The minimum fell below 40° in Kan., Mo., western Ky. and Ohio, with frosts as far south as Kan., Mo., Tenn., West Virg., Md. and Conn., and occasionally ice from Kan. to Ky. On the morning of the 8th, the highest, 30.30, was near and northwest of Memphis, its progress eastward having been checked by low pressures No. III to the north of it and No. IV in the Eastern Gulf. The frost-area reached Neb., Ia., Tenn. and Virg. At 7:35 a. m., of the 9th, isobar 30.30 enclosed the country from Ky. and the Ohio valley to New Jersey. Freezing temperatures were reported from Minn. and the Lakes to the interior of the Mid. and Eastern States, and frosts from Kan., Mo., Tenn., Mid. States and New Eng. northward. During the 9th and 10th it lost its distinctive features, due to low pressures No. IV and V. On the latter morning, an area, in which the minimum was below 40°, reached from Tenn. to New Eng., Nova Scotia and New Brunswick, with reports of frost from Tenn. and Virg., north and northeastward. The Signals ordered the 6th, on the Texas coast, for a "norther," were not justified.

No. III.—During the 9th it advanced southeastward over the Northwest, following low pressure No. V. On the morning of the 10th the highest, above 30.20, was in Dakota and Neb., and the temperature fell below freezing from Wyoming to Wis., with a minimum of 19° at Breckenridge. By 7:35 a. m., of the

11th, the pressure had increased, and an area of 30.40 was central in Iowa, with temperatures below freezing from northeastern Neb. to northern Ohio, and a minimum of 10° at Breckenridge. Frosts occurred as far southward as Ark., northern Miss., Tenn., W. Va., Md. and New Jersey. During the day it continued southward and eastward, and, by the morning of the 12th, an area of above 30.40 covered the Mid. Atl. States. The minimum temperature was below freezing from Indiana to the interior of the Mid. and Eastern States, and lowest, 26°, at Cleveland. Frosts were reported from Miss. to the interior of N. C., the Mid. States and New Eng. On the morning of the 13th the pressure had diminished, and isobar 30.20 included an extensive area, reaching from Penn. and New Jersey to northern Ala. Frosts occasionally occurred from Tenn. and Ky. to the Mid. and Eastern States, with minimum, 30°, at Cleveland, 32° at Washington, and 40° at Knoxville. During the 13th and 14th it was gradually dissipated in the Southern States as low pressure No. VI advanced eastward.

Nos. IV and V.—Following low pressure No. VI, the former was first observed in Manitoba on the 12th, but its progress south and eastward was delayed until the 13th. At 7:35 a. m., of the 14th, isobar 30.50 included an area extending from western Neb. over Dakota and Manitoba, with minimum temperature of 6° at Pembina, and near or below freezing from Neb. to northern Mich. On the morning of the 15th it was central in Iowa, with a minimum of 1° at Breckenridge, and freezing temperatures as far southward as Kan., Mo., Ky. and interior of Mid. and Eastern States. Reports of frosts came from Indian Ty., Ark., Tenn., Mid. States and New Eng. On the morning of the 16th the highest, 30.40, was central in eastern Tenn., with temperatures near or below freezing from Indian Ty. to N. Car. and northeastward, and a minimum of 25° at Knoxville. Frosts occurred as far southward as the interior of the Gulf States and the Carolinas. By morning of the 17th the pressure had diminished somewhat, and was central in northern Ga., with frosts thence north and northeastward, and a minimum temperature of 25° at Knoxville. During the 17th high pressure No. V advanced southeastward over the Lake region, the two combined by morning of the 18th, and isobar 30.20 enclosed the country reaching from N. Car. northward over the Lower Lakes into Canada. Minimum temperatures of 22° at Parry Sound, 33° at Washington and 40° at Augusta were reported, with frosts as far southward as Tenn. and interior of N. Car. At 7:35 a. m., of the 19th, it was central in the Mid. Atl. States, with minimum temperatures near or below freezing from eastern Tenn. northeastward over the Mid. and Eastern States. Frosts occurred from Va. northeastward. In advance of low pressure No. VIII, and the hurricane moving northward over Florida, it gradually disappeared on the 19th and 20th on the New Eng. coast. On the morning of the latter frosts were occasionally reported from N. Y. and New Eng.

No. VI.—On the morning of the 20th the pressure was quite high at Portland, Or.; the temperature below freezing at Virginia City, Cheyenne and Santa Fe, and continued below on the following morning, with rising barometer. During the night of the 21st it extended southeastward over Texas, where, in connection with a minor depression left by low pressure No. VIII, a severe "norther" was produced. At Indianola a wind velocity of 44 miles per hour was recorded, and at Galveston, 48 miles. At 7:35 a. m., of the 22nd, it was central in southern Texas, with a minimum temperature of 27° at North Platte, and occasional frosts from Kansas to New Mexico, after which it gradually lost its distinctive features in the Gulf States.

Nos. VII and VIII.—On the 23rd the former advanced southeastward over the Mo. valley, with minimum temperatures on the following morning of 25° at Bismarck and 28° at Denver. By 7:35 a. m., of the 25th, the pressure had increased and the highest, above 30.20, was central over the Lower Miss. valley, with frosts as far southward as Tenn. and N. Car., and minimum of 20° at Breckenridge, 36° at Fort Gibson. During the day it moved eastward over the Gulf States, and No. VIII advanced southward over Manitoba, with a minimum of 11° at Pembina, and frosts from the Carolinas and Tenn. northward on the morning of the 26th. By 7:35 a. m., of the 27th, the two had united, and isobar 30.40 included the country from Ohio to northern Georgia and the Carolinas. Frosts occurred from northern Mo., Tenn. and N. Car. north and eastward, with minimum temperatures of 26° at Grand Haven and 32° at Lynchburg. By the following morning, in advance of low pressure No. IX, it had moved southward and covered the South Atl. States, with frosts in Middle States and New Eng. At 7:35 a. m., of the 29th, it was central in southern Georgia, but with diminished pressure, where it continued on the 30th.

No. IX.—During the night of the 28th it advanced southeastward from Canada towards the Middle and Eastern States, with temperatures below freezing in New York and New Eng. At 7:35 a. m., of the 30th, it was central over eastern New York, with frost from New Jersey north and northeastward. During the 30th it apparently extended southward, probably united with No. VIII, and was central in the Carolinas on the morning of the 31st.

*Areas of Low Pressure.*—Nine have been traced, and charted upon Map No. I. Excepting the hurricane of the 17th to 23rd, the centres of all have moved over the northern sections, and farther northward than during previous Octobers. They have been frequently accompanied by barometric troughs, extending south or southwestward towards the Gulf, in which rainy weather and high winds or gales have prevailed.

No. I.—During the night of the 1st its approach was indicated by a rapid fall of the barometer in Manitoba. On the 2nd, as it progressed eastward, with a barometric trough extending toward Indian Ty., light rains fell in Manitoba and northern Mich. at night, and the hourly wind-velocity reached at Dodge City, N. 30; La Crosse, S. high; Marquette, S. 30; Escanaba, S. 28; Chicago, SW. 26; Grand Haven, W. 36 miles. During the 3rd light snow fell in Minn. and Wis., hail in northern Mich., and light rains thence to the Ohio val. and Lower Lake region, with velocities at Erie, SW. 28; Buffalo, W. 36; Cape Lookout, SW. 32; Cape May, SW. 36. On the 4th light rains occasionally fell from Lake Huron, the Lower Lakes, Ohio val. and Tenn. to the St. Lawrence val. and New Brunswick, with thunder-storms in New York and Tenn.,

and sleet or snow in Mich. On Mt. Washington a W. gale prevailed; at Eastport, S. 26 miles. The 5th light rains continued from N. C., Tenn. and the Ohio val. northeastward. A secondary depression was developed in northern Texas the 4th and 5th, producing thunder-storms. Cautionary Signals were displayed at the Lake stations on the 2nd, nearly all which were justified, and warnings sent the Canadian Lake stations.

No. II.—The night of the 4th this storm approached Minn. During the 5th snow accompanied it from northern Dakota to northern Mich., with a fall of 6 in. at Duluth. The rain area extended south to Iowa and east to Lake Erie, with occasional thunder-storms in Minn., Iowa and Mich. Lowest bar., 28.92, at Pembina; wind-velocities at Bismarck, NW. 69; St. Paul, SW. 36; Escanaba, S. 36; Alpena, SE. 28; Detroit, W. 30. The 6th, as it passed eastward, a trough was produced southward, and rainy weather reached Tenn., Mid. States, New Eng. and eastern British Provinces, with thunder-storms in Mass. Maximum velocities: Duluth, NW. 36; Grand Haven, NW. 38; Erie, W. 36; Buffalo, W. 60; Rochester, W. 36; Morgantown, SW. 40; Cape Hatteras, SW. 36; Sandy Hook, W. 45; Wood's Holl., S. 35. During the 7th thunder-storms occurred in Me., and high N. W. winds or gales along the Mid. Atl. and New Eng. coasts; maximum, Cape May, 50; Sandy Hook, 48; Newport, 36; Mt. Washington, a hurricane; off Savannah, a heavy SW. gale. Signals were ordered on the 5th along the Lakes and New Jersey coast; the 7th, on the New England, Virg., and N. Car. coasts. All were verified, except for Maine. Cautions were also sent the Canadian stations.

No. III.—On the 7th light snow occasionally fell from northern Minn. to northern Mich., and light rains thence to Lake Erie, accompanied by brisk winds, reaching SW. 31 at Grand Haven. During the 8th light rains, turning into sleet or snow, were reported from Mich. to northern New England, and occasionally high winds. Rochester, W. 36; Sandy Hook, SW. 40; Boston, W. 25. Not any Signals were ordered.

No. IV.—Its movement could not be traced. During the night of the 7th a thunder-storm occurred at Key West. A steamer thence to Galveston encountered a hurricane in long.  $87^{\circ} 50'$ , and on the 8th a heavy "northwester". The latter date heavy rains fell from northern Fla. to N. Car.; at Newport, Fla., 8.2, at St. Marks, 5.47 in. On the 9th and 10th rainy weather continued from Fla. to eastern N. Car., with wind NE. 30 at Cape Hatteras and Kitty Hawk, and NE. 38 at Cape Lookout. Signals displayed on the 8th and 9th from St. Marks to Cape Hatteras were reported verified from latter to Charleston only.

No. V.—During the night of the 8th its advance was indicated by rapidly falling barometer in Manitoba and Minn. Its progress southeastward was very rapid on the 9th, and accompanied by high winds and gales from the Missouri valley to the Lakes. Light rains occasionally fell from northern Minn. to Lake Huron. Maximum velocities: Pembina, NW. 40; Marquette, W. 38; Grand Haven, SW. 55; Port Huron, S. 32. During the 10th its course was northeastward, with a barometric trough extending southward. Light rains, partly turning into snow, fell from Mich. and Lake Ontario to the St. Lawrence valley, and at night from Penn. to Me. Maximum velocities: Buffalo, Parry Sound and Erie, W. 32; Oswego Co., N. Y., tornado; Cape May, N. 37. On the 11th it disappeared over the Gulf of St. Lawrence. In connection with high pressure No. III, high winds and gales were produced along the Mid. Atl. and New Eng. coasts: Cape Lookout, NE. 42; Kitty Hawk, NE. 40; Sandy Hook, NW. 40; Thacher's Id., NW. 42; Mt. Washington, W. hurricane. Cautionary Signals were ordered on the 9th along the Lakes, New Eng. and New Jersey coasts, and the 11th on the N. C. coast, besides warnings sent the Canadian stations, all of which were justified, excepting Duluth.

No. VI.—During the night of the 12th it developed in the Lower Mo. valley, and advanced northeastward the 13th, accompanied by occasional thunder-storms in Kan., Neb., Mo., Ill. and Mich., and snow in northern Mich. and Manitoba. On the 14th it became more extensive, with diminishing pressure. Threatening and rainy weather prevailed from the Southwest northeastward over Tenn. and the Ohio val. to Mich., the St. Lawrence valley and Nova Scotia, and gradually turning into snow or sleet from Michigan eastward. High winds were also frequently reported: Escanaba, NW. 32; Rochester, W. 30; also thunder-storms from North Carolina and Maryland. Early during the morning of the 15th, snow fell as far southward as North Carolina; greatest depth 3.5 inches at Fall River, Mass., with the pressure still diminishing. Maximum velocities: Cape Hatteras, N. 38; Cape Henry, NW. 48; Cape May, W. 48; Sandy Hook, NW. 45; Newport, W. 36; Mt. Washington, NW. hurricane. The lowest barometric reading, 28.87 in., was reported from Chatham, N. B., on the morning of the 16th. During the day the following velocities were recorded: Buffalo, W. 40; Rochester, W. 36; Eastport, NW. 29; Sydney, W. 32; Father Point, W. 49. In the Gulf of St. Lawrence very severe weather was experienced during the 15th and 16th; at Harbor Grace, N. F., bar. 29.38, with high westerly winds. Signals were displayed on the 14th along the Lower Lakes, New Eng., Mid. Atl. and N. C. coasts, and the 15th from Nova Scotia to the mouth of the St. Lawrence, all of which were justified, except that those for the Lower Lakes were lowered too soon.

No. VIII.—From the data collected up to the present, this hurricane can only be traced from the 17th, when it was encountered by vessels in the Caribbean Sea, south of Cuba, and in the vicinity of the Cayman Islands. On the 18th it struck the western half of Cuba. At 11:45 a. m., of the 19th, the barometer reached its minimum, about 28.7 in., as recorded at Belen College Observatory, Havana, and the wind, which had varied between ENE. and NNE., backed to N. and fell to a calm. Therefore the path of the hurricane was directly over that city, and slightly to the eastward of Key West, as the following hourly observations, taken at latter, show:

Rainfall.	Barometer.	Wind velocity. Miles per hour.	Wind direction.	Time.	Date.
.....	29.65	.....	.....	1 A.M.	
.....	29.60	31	NE	2	
.....	29.60	30	NE	3	
.....	29.60	28	NE	4	
.....	29.59	28	NE	5	
.....	29.58	31	NE	6	
.90	29.57	42	NE	7	
.....	29.52	39	NE	8	
.....	29.50	42	NE	9	
.....	29.45	42	NE	10	
.....	29.35	44	NE	11	
.....	29.20	46	NE	12 M.	
.....	29.15	49	NE	1 P.M.	
.....	29.11	57	NE	2	
.....	29.00	58	NE	3	
.....	28.92	66	NE	4	
.....	28.85	58	NE	5	
.....	28.80	35	W	6	
.....	28.77	14	SW	7	
.....	28.73	11	SW	8	
.....	28.80	63	SW	9	
.....	28.85	56	SW	10	
3.00	28.91	50	SW	11	
.....	29.20	40	SW	12	
.....	29.38	38	SW	1 A.M.	
.....	29.42	35	SW	2	
.....	29.46	35	SW	3	
.....	29.50	30	SW	4	
.....	28	SW	5		
0.75	.....	.....	7		

Keokuk, SW. 40; Grand Haven, SW. 34; Port Huron, SE. 32; Toledo, SW. 32; Erie, SE. 28. On the 21st it disappeared over Lake Superior, and occasional thunder storms occurred from Texas and La. to Ill. and Ind. A secondary depression was left in the Southwest, and passed into the Gulf, in rear of which a severe "norther" was felt on the Texas coast; at Indianola N. 44, Galveston, N. 48, night of 21st. Signals were displayed at Duluth the 19th and the other Lake stations, excepting along Ontario, the 20th. All were justified except for Escanaba, Marquette and Alpena.

No. IX.—From the 25th to the 30th rainy weather prevailed in Wash. Ty. and Oregon, and the barometer reached its minimum, 29.42, at Portland morning of 28th; snow fell in Nevala, 27th to 30th; rain turning into snow in Montana, 28th to 31st, Utah, 28th to 30th, and New Mexico, 31st; occasional snow in Wyoming, 29th. During the 27th there were indications of a storm advancing southeastward from Dakota; thunderstorms occurred from Ky. and Ohio to Mich., Wis. and Ind., with snow in northern Mich., and velocity NE. 28 at Duluth. On the 28th a barometric trough extended from the Missouri valley towards the Ohio valley and Middle States, in which thunderstorms were produced from Iowa to Mich., Penn. and Ohio valley, with rain and snow from Conn. and N. Y. to Mich. High winds: Duluth, E. 28; Cape Lookout, SW. 30. The 29th thunderstorms occurred from Ky. and Ohio to Iowa. On the 30th it broke up into several minor depressions, with increasing pressure throughout the Northwest and Upper Lake region, and continued thunderstorms from Iowa to Mich. and Ind. During the 31st light rains fell in Nova Scotia, New Brunswick and the St. Lawrence valley; thunderstorms in Texas, N. Y., and from Kan. to Wis., Mich. and Ohio. Cautionary Signals were ordered for Duluth the 29th, but not verified.

*Local Storms.*—2nd, at Stanwix, A. Ty., SW. sand-storm. 3rd and 4th, cyclone passed over Central America, with great destruction of property and loss of life, especially at Anagua and Blewfields, about lat. 12° N.; steamer "Costa Rica" experienced same near Point Arenas, on the Pacific side, about 10° N. 12th, off Watch Hill, R. I. schooner capsized by whirlwind; Fort Yuma, Cal., and Stanwix, A. Ty., S. to SW. sand-storm. 19th, severe wind and rain storm over Boonville, Mo. 20th, Fort Yuma, Cal., N. sand-storm; Stanwix, A. Ty., N. and NW. gale. 28th, Orleans, Ind., unusually heavy and destructive rain-storm. 31st, sand-storms at Maricopa Wells, A. Ty., Fort Yuma, (N.) and Vallecitas, (NE.) Cal.; at Stanwix, A. Ty., high N. and NW. winds. A cyclone passed over the districts of Soonderbonds and Backer-gunjie, and the mouths of the Ganges and Bramapootra rivers, east of Calcutta, British India, night of the 31st, with an immense tidal wave. Late accounts say 120,000 persons perished.

*Vessels experiencing Storms.*—On the 2nd, lat. 47° 20' N., long. 41° 30' W., h'y WSW. to WNW. gales.

At 7 p. m., of the 19th, the anemometer registered one mile in thirteen minutes; at 8:45 p. m., twenty-two miles for fifteen minutes, or at the rate of 88 miles per hour. Over the southern half of Florida and in the Florida Straits it was unusually severe on the 19th and 20th. Very heavy rains fell thence northward along the South Atl. coast, and light rains from Va. to southern New Eng. On the 20th, in lat. 29° 50' N., long. 79° 48' W., the wind backed from E. to NW.; off Cape Canaveral, Fla., shifted from E. to NW., bar. 28.82; 32° 32' N., 73° 30' W., veered from ESE. to W.; 37° N., 69° W., backed from SSE. to NNE. 21st, 30° N., 71° 30' W., veered from SSW. to NW.; 30° 37' N., 75° 30' W., shifted from E. to W., with sea rolling mountains high; 30° 50' N., 65° W., veered from S. to WNW. At Bermuda a SE. gale commenced on the 20th, veered to S. on 21st, to SW. by morning of 22nd, with barometer 29.35 in. and heavy rain; morning of 23rd, barometer 29.30, wind began to moderate, veered to W. by noon, and the rain ceased. Off Bermuda a heavy SW. gale, veering to NW., was experienced on the 23rd. Cautionary Signals were ordered to be displayed on the 19th along the Gulf and South Atl. coasts, and on the 20th along the Mid. Atl. and southern New Eng. coasts, and the stations notified of the presence of the hurricane. Those along the South Atl. coast alone were justified, but the warnings served to prevent vessels from running out of port and into the hurricane.

No. VIII.—This storm can be traced to the Pacific coast. In Washington Ty. and Oregon frequent rains fell from the 15th to the 22nd, with thunder-storms on 17th, 18th and 19th in latter. At Portland, minimum barometer, 29.58, 11 p. m., 17th; at Camp McDermitt, Nev., snow on the 19th; Virginia City, Mont., snow 18th to 20th; Salt Lake City, snow 20th; Mt. Carmel, Utah, thunder-storms, 17th and 18th; in Wyoming Ty., snow 18th to 20th; Pike's Peak, gales with snow 20th and 21st. From 17th to 19th there was a slow but steady decline in the barometer from the Mississippi Valley to the Rocky Mts., with occasional thunder-storms from Texas, La. and Miss. to Kan. and Illinois. During the 20th it could be definitely traced. High wind, threatening and rainy weather prevailed from Missouri and Ohio valleys to the Lakes, with thunder-storms from Wis., Iowa and Mo. to Mich. and Ohio; at Dodge City, W. 34; Duluth, NE. 28;

3rd,  $46^{\circ}$  N.,  $33^{\circ}$  W., h'y NW. and SW. gales. 2nd to 23rd,  $40^{\circ}$   $20'$  N.,  $41^{\circ}$   $30'$  W., to banks of Newfoundland, continuous and terrific WSW. to WNW. gales. 4th,  $45^{\circ}$  N.,  $29^{\circ}$  W., h'y gales. 5th,  $50^{\circ}$  N.,  $32^{\circ}$  W., h'y gale. 7th, (?)  $47^{\circ}$  N.,  $5^{\circ}$  W., violent hurricane. 10th,  $51^{\circ}$   $53'$  N.,  $21^{\circ}$   $10'$  W., h'y gale;  $51^{\circ}$   $11'$  N.,  $47^{\circ}$  W., h'y gales. 15th,  $45^{\circ}$  N.,  $33^{\circ}$  W., h'y west gale;  $41^{\circ}$   $15'$  N.,  $65^{\circ}$  W., violent west gale; off Cape Hatteras h'y gale. 16th,  $49^{\circ}$   $42'$  N.,  $26^{\circ}$   $04'$  W., h'y NNW. gale. 17th, between Capes Cod and Elizabeth, h'y NW. gale; off Spanish Town, near San Francisco, h'y gale. 20th,  $57^{\circ}$  N.,  $30^{\circ}$  W., S. to W. gale. 24th,  $49^{\circ}$   $56'$  N.,  $10^{\circ}$   $54'$  W., h'y SE. to NW. gale;  $53^{\circ}$  N.,  $55^{\circ}$  W., h'y N. gale. 29th,  $19^{\circ}$  N.,  $62^{\circ}$   $30'$  W., h'y gale.

## TEMPERATURE OF THE AIR.

The isothermal curves and figures upon chart No. II illustrate the general distribution of the temperature of the air for the present month. A reference to the table in the lower left-hand corner of the same chart will show that the average is above that for years on the Pacific coast; it is below in the other districts, especially in the South Atlantic and Middle Atlantic States, Minn., St. Lawrence valley and Lake region.

*Minimum and Maximum Temperatures*, respectively, are given for the following stations, viz: Albany,  $23^{\circ}$ ,  $70^{\circ}$ ; Alpena,  $25^{\circ}$ ,  $65^{\circ}$ ; Atlantic City,  $30^{\circ}$ ,  $74^{\circ}$ ; Augusta,  $36^{\circ}$ ,  $86^{\circ}$ ; Boston,  $26^{\circ}$ ,  $70^{\circ}$ ; Bismarck,  $14^{\circ}$ ,  $74^{\circ}$ ; Breckenridge,  $8^{\circ}$ ,  $66^{\circ}$ ; Buffalo,  $24^{\circ}$ ,  $73^{\circ}$ ; Cairo,  $32^{\circ}$ ,  $83^{\circ}$ ; Cape Hatteras,  $42^{\circ}$ ,  $76^{\circ}$ ; Cape May,  $34^{\circ}$ ,  $73^{\circ}$ ; Cheyenne,  $23^{\circ}$ ,  $75^{\circ}$ ; Chicago,  $28^{\circ}$ ,  $73^{\circ}$ ; Cincinnati,  $29^{\circ}$ ,  $74^{\circ}$ ; Cleveland,  $26^{\circ}$ ,  $75^{\circ}$ ; Corsicana,  $36^{\circ}$ ,  $92^{\circ}$ ; Davenport,  $25^{\circ}$ ,  $75^{\circ}$ ; Denver,  $24^{\circ}$ ,  $85^{\circ}$ ; Detroit,  $24^{\circ}$ ,  $72^{\circ}$ ; Dodge City,  $24^{\circ}$ ,  $85^{\circ}$ ; Duluth,  $23^{\circ}$ ,  $67^{\circ}$ ; Eastport,  $28^{\circ}$ ,  $60^{\circ}$ ; Fort Gibson,  $32^{\circ}$ ,  $82^{\circ}$ ; Indianapolis,  $26^{\circ}$ ,  $75^{\circ}$ ; Indianola,  $50^{\circ}$ ,  $85^{\circ}$ ; Jacksonville,  $43^{\circ}$ ,  $85^{\circ}$ ; Key West,  $68^{\circ}$ ,  $91^{\circ}$ ; Leavenworth,  $29^{\circ}$ ,  $80^{\circ}$ ; Lynchburg,  $32^{\circ}$ ,  $80^{\circ}$ ; Malone,  $21^{\circ}$ ,  $74^{\circ}$ ; Marquette,  $28^{\circ}$ ,  $73^{\circ}$ ; Mobile,  $43^{\circ}$ ,  $82^{\circ}$ ; Mt. Washington,  $5^{\circ}$ ,  $48^{\circ}$ ; Nashville,  $29^{\circ}$ ,  $86^{\circ}$ ; New London,  $30^{\circ}$ ,  $67^{\circ}$ ; New Orleans,  $50^{\circ}$ ,  $84^{\circ}$ ; New York,  $31^{\circ}$ ,  $73^{\circ}$ ; North Platte,  $22^{\circ}$ ,  $81^{\circ}$ ; Omaha,  $23^{\circ}$ ,  $75^{\circ}$ ; Oswego,  $29^{\circ}$ ,  $70^{\circ}$ ; Pembina,  $6^{\circ}$ ,  $76^{\circ}$ ; Pittsburgh,  $28^{\circ}$ ,  $80^{\circ}$ ; Pike's Peak,  $-2^{\circ}$ ,  $41^{\circ}$ ; Philadelphia,  $31^{\circ}$ ,  $75^{\circ}$ ; Portland, Or.,  $42^{\circ}$ ,  $79^{\circ}$ ; Salt Lake City,  $30^{\circ}$ ,  $83^{\circ}$ ; San Diego,  $48^{\circ}$ ,  $80^{\circ}$ ; San Francisco,  $52^{\circ}$ ,  $72^{\circ}$ ; Santa Fe,  $27^{\circ}$ ,  $78^{\circ}$ ; Shreveport,  $38^{\circ}$ ,  $85^{\circ}$ ; Vicksburg,  $35^{\circ}$ ,  $86^{\circ}$ ; Virginia City,  $20^{\circ}$ ,  $71^{\circ}$ ; Washington,  $30^{\circ}$ ,  $78^{\circ}$ ; Wilmington,  $32^{\circ}$ ,  $80^{\circ}$ ; Wood's Holl,  $32^{\circ}$ ,  $68^{\circ}$ ; Yankton,  $16^{\circ}$ ,  $77^{\circ}$ .

*Ranges of Temperature*.—At Key West,  $23^{\circ}$ ; San Diego,  $32^{\circ}$ ; San Francisco,  $20^{\circ}$ ; Portland, Or.,  $37^{\circ}$ ; Gulf States,  $34^{\circ}$  to  $56^{\circ}$ ; South Atlantic States,  $34^{\circ}$  to  $50^{\circ}$ ; Middle Atlantic States,  $39^{\circ}$  to  $48^{\circ}$ ; New England,  $32^{\circ}$  to  $50^{\circ}$ ; Lower Lake region,  $41^{\circ}$  to  $49^{\circ}$ ; Upper Lake region,  $35^{\circ}$  to  $48^{\circ}$ ; Ohio valley and Tennessee,  $45^{\circ}$  to  $56^{\circ}$ ; Upper Mississippi and Lower Missouri valleys,  $47^{\circ}$  to  $52^{\circ}$ ; Valley of the Red River of the North,  $58^{\circ}$  to  $70^{\circ}$ ; Dakota and western portions of Nebraska and Kansas,  $59^{\circ}$  to  $61^{\circ}$ ; Pike's Peak and Mt. Washington,  $43^{\circ}$ ; Denver,  $61^{\circ}$ ; Virginia City and Santa Fe,  $51^{\circ}$ ; Cheyenne,  $52^{\circ}$ ; Salt Lake City,  $53^{\circ}$ .

*First frosts of the season*.—Ala., Mt. Vernon and Green Springs, 2nd. Cal., San Jose, 13th; Camp Independence, 22nd and 23rd. Conn., Southington, 2nd. Col., So. Pueblo, (just enough to kill vines,) and Denver, 1st. Ill., Anna and Cairo, 7th. D. C., Washington, 8th. Ind., Spiceland, 1st. La., Lake Charles, 2nd, (unusually early.) Ky., Louisville, 7th. Md., Fallston, 8th. Mass., Williamstown, 2nd; Somerset, 3rd; Westboro', (also freeze,) 3rd; Worcester and Andover, 8th. Miss., Brookhaven and Fayette, 2nd. N. H., Shelburne, 2nd; Auburn, 8th. N. J., Freehold and Linden, 8th. N. Y., Brookhaven, 3rd; Hudson, 7th; Rodman, 8th; Hector, 9th; New York City, 15th. N. C., Smithville, 2nd; Attaway Hill, 4th. Ohio, Cincinnati, (Mt. Auburn,) 7th. Penn., Chambersburg, 8th. Texas, Gilmer, 1st; Melissa, (heavy,) 2nd. Vt., Norwich, 3rd; Westminster, 8th. Va., Prospect Hill, 12th. W. Va., Morgantown, 7th.

*First heavy or killing frosts, freeze or ice*.—Ala., Green Spring, (ice,) 16th. Miss., Jackson, 2d. Ark., Monticello, cotton injured, 2d. Conn., Colebrook, 8th. D. C., Washington, 12th. D. I., Melford, 12th. Ga., Gainesville, 1st; Atlanta, (ice,) 2d and 3d. Ill., Riley, (potato and tomato vines killed,) 5th; Anna, 12th; Carbondale, (ice,) 16th. Ind., Laconia, 7th; Wabash, (ice,) 8th; St. Meinrad, (ice,) 16th. Iowa, Rockford, (ice,) 1st; Daveport and Keokuk, (ice,) 7th; Council Bluffs, (ice,) 11th. Me., Cornish, 3d; Westerville, 10th. Mass., Worcester, 12th. Ky., Louisville, (ice,) 15th. Kan., Dodge City, (ice,) 1st. Mich., Litchfield, 5th; Detroit, 9th; Port Huron, (ice,) 15th. N. H., Auburn, (ice,) 9th. N. J., Freehold and Linden, (ice,) 9th. N. Y., Palermo, (ice,) 12th. N. C., Lenoir, 2nd; Attaway Hill and Asheville, 16th. Ohio, Bellefontaine, 4th; Kenton, 8th; Urbana and Cincinnati, (Mt. Auburn, ice,) 9th; Cincinnati, 15th. Penn., Chambersburg, 9th; Tioga, 12th; Philadelphia and Erie, (ice,) 15th. Tenn., Rockwood, 16th. Texas, Gilmer, 16th; Melissa, (ice,) 17th; Clarksville, cotton crop injured by frosts. Va., Lynchburg, Accotink and Comorn, 12th; Prospect Hill and Hampton, (the earliest since 1868,) 16th. West Va., Morgantown, (ice,) 12th. Utah, Kanab, 20th, (killing vines, &c.)

## PRECIPITATION.

Upon chart No. III is represented the amount of rain-fall and melted snow. The figures 15.87, accidentally printed in southeastern Fla., belong to Daytona, Volu-in County, lat.  $29^{\circ}$   $13'$ , long.  $81^{\circ}$   $01'$ . The excess in the South Atl. and Eastern Gulf States is due to storm No. IV, and the hurricane No. VII; that on the Pacific, to the rainy weather along the coast of northern Cal., Or. and Wash. Ty., from 15th to 22nd and 28th to 31st. In western Texas the rain-fall was 1.01 in. at Fort Stockton and 1.27 at Fort Duncan; in northern Texas, 1.50 at Fort Griffin.

Stations at which *not any rain* fell during the month.—Fort Lyon, Col.; Jackson, Miss.; Sydney Barracks, Neb.; Fort Concho, Tex.; Camp Brown, Fort Fetterman and Cheyenne, Wyo.; Mount Solon, Va.; Yuma and Stanwix, A. T.

*First rain-fall of the season*.—Cal., Benicia Barracks, 16th; El Monte, 17th; Vallecitas, 28th.

**Heavy Rain-falls.**—Newport, Fla., 4.4 in. 7th, 8.2 in. 8th, and 3.0 in. 9th; Quitman, Ga., 11 a. m. 7th to 5 a. m. 11th, 14.25 in.; Daytona, Fla., 1 p. m. 6th to 9th, 7.18 in., and 18th, 19th and 20th, 8.20 in.

**First snow of season.**—Mass., Billerica, 15th. Mich., Ft. Wayne, 7th. N. Y., Albany, 11th; West Point and Brookhaven, 15th; North Argyle, 17th. R. I., Newport, 15th. Me., West Waterville, 11th. N. H., Shelburne, 11th. Ohio, Hudson, 7th. Penn., Philadelphia, 15th; Tioga, 28th. Va., Norfolk and Richmond, 15th. Vt., Woodstock and Lunenburgh, 8th; Westminster, 16th. D. C., Washington, 15th.

**Total Snow-fall.**—Penn., New Castle, 1 in. N. Y., Cazenovia, 6 in.; White Plains, 3 in. Mich., Northport, 2.7 in. Col., Summit, 2.3 in.

**Cloudy Days.**—The number on which the cloudiness has averaged eight-tenths or more, as reported by the volunteer observers, ranges in New Eng. from 5 to 13; Mid. States, 4 to 17; South Atl. States, 3 to 14; Gulf States, 0 to 15; Ohio valley, Tenn. and Ark. 4 to 16; Lake region, 6 to 21; Northwest, 3 to 17.

**Rainy Days.**—The number on which a greater or less quantity of rain or snow fell averages as follows in the various districts: Atl. States, 10; Gulf States, 4; Tenn., 9; Ohio valley, 12; Lower Lake region, 19; Upper Lake region, 14; Upper Miss. valley, 8; Mo. valley, plains of Ne., Ks. and Indian Ty. and Cal. coast, 7; Or., 15; Rocky Mt. stations, varies from 3 to 13.

**Droughts.**—Me., water in Sebago very low 31st. Mass., water in Watuppa Lake 58 $\frac{1}{2}$  inches below high water mark, probably lowest since 1857. Miss., Brookhaven, droughts very severe. N. H., at Shelburne and Dumbarton, wells, springs and streams low, 31st. N. Y., Cooperstown, streams and springs low 31st; Wappinger's Falls, water in lake very low, factory only able to run half time. Vt., Woodstock, drought severe; West Charlotte, Lake Champlain very low 31st. West Va., Salem, very dry, streams low 31st. Texas, Corsicana, continued droughts, (and grasshoppers,) have destroyed the stock ranges, and in some parts of country people are hauling water 10 or 12 miles—no wheat planted, ground too hard to plough. Utah, Kanab, water low in creeks, 2nd.

## RELATIVE HUMIDITY.

The average relative humidity ranges, for the Atlantic coast stations, from 67 to 74 per cent.; interior of the Mid. and New Eng. States, 64 to 74; South Atl. States, 68 to 75; Gulf coast, 69 to 77; interior of Gulf States, Tenn. and the Ohio valley, 55 to 66; Lower Lake region, 65 to 70; Upper Lake region, 59 to 77; Upper Miss. valley, 51 to 65; Mo. valley, 51 to 63; Minnesota, 65 to 72; plains of Kan. and Neb. 54; Rocky Mt. stations, 32 to 71; Pacific coast, 64 to 81. **Moist stations:** Mt. Washington averages 91 per cent; Portland, Or., 81; San Francisco, 78; St. Mar's and Alpena, 77; Charleston and Indianola, 75; Cape Hatteras, Smithville and Albany, 74; Escanaba and Wilmington, 73. **Dry stations:** Denver averages 32 per cent; Cheyenne, 39; Salt Lake City, 47; Virginia City, 48; Santa Fé, 49; St. Louis, 51; Bismarck, 53.

## WINDS.

**Prevailing winds.**—The points of the compass from which the winds have blown most frequently are indicated by the arrows, flying with the wind, upon chart No. II. On Mt. Washington they have been from the NW.; Yuma, S.; Camp Lowell, Maricopa and Stanwix, A. T., W.; Campo, (west of Yuma,) W.; Bourne, (northwest of San Antonio,) Tex., S.; Smithville, N. C., SW.

**Maximum velocities.**—On the summit of Pike's Peak, NW. 72, 23rd; Mt. Washington, NW 96, 15th; Santa Fé, W. 38, 19th.

**Total movements.**—The largest total movements of the wind, independent of direction, have been recorded at the following stations, viz: Pike's Peak, 13,703 miles; Cape May, 12,394; Cape Lookout, 12,084; Sandy Hook, 11,697; Grand Haven, 10,928; Erie, 10,056; Pembina, 9,298; Key West, 9,736; Cape Hatteras, 9,405; Barnegat, 9,062. No continuous record has been obtained for Mt. Washington. The following stations report the smallest movements: Lynchburg, 2,385 miles; Portland, Or., 2,535; Augusta, 2,755; Nashville, 3,023; Vicksburg, 3,140; Shreveport, 3,334; Salt Lake City, 3,418; Memphis, 3,489; Virginia City, 3,493; Springfield, 3,524.

## VERIFICATIONS.

**Probabilities.**—As worked up three times daily and issued to the public, they have been carefully compared with the actual conditions during the succeeding twenty-four hours, and the following result obtained, viz: the percentage verified averages 90.1 for New England; 90.1, Middle States; 92.5, South Atlantic States; 88.6, East Gulf States; 87.1, West Gulf States; 91.9, Ohio valley and Tennessee; 88.5, Lower Lake region; 91.9, Upper Lake region; 91.7, Upper Mississippi valley; 91.2, Lower Missouri valley. The average is 92.8 per cent. for the Weather; 90.1, Wind Direction; 91.1, Temperature; 87.7, Barometric Changes. For the whole country the average verified is 90.4 per cent. There were 4 omissions to predict out of 3,720, or 0.1 per cent.

**Cautionary Signals.**—They were ordered to be displayed at 167 stations, along the Lakes and Atlantic and Gulf coasts. Of these 120 were justified; 3, lowered too soon; 1, displayed late. Out of 47 not justified, 20 were ordered during the advance of the hurricane, No. VII, viz: 5 along the Gulf coast before it was certain what course it would pursue, and 15 from Virginia to Maine, to prevent vessels from running into it. There were 55 cases reported, generally from scattered stations, in which the wind-velocity reached 25 miles, and over, per hour, without the display of Signals. To the Canadian stations 52 warnings have been sent, but with what result is not known.

## NAVIGATION.

*Height of Rivers.*—Upon chart No. III is a table giving the highest and lowest water-marks, with the dates upon which they occurred. The highest water at Nashville on the 25th was 3 feet 11 in., the figures in the table being in error. At Pittsburgh, navigation in general suspended on account of low water, 21st; 31st, a few boats left, but the slight rise was not sufficient for a resumption of navigation.

## TEMPERATURE OF WATER.

As heretofore, the maximum and minimum temperatures alone, with the average depth of the water, are given in the table on chart No. II.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms.*—The dates, states, accompanied by hail, and number of stations, when more than one, in each, are as follows: 1st, Ala.; Cal.; Ill.; Nev.; N. Y. 4th, N. Y.; Tenn.; Texas. 5th, Iowa, 2; Mich.; Minn.; Texas. 6th, Mass. 7th, Fla.; Me. 8th, Ariz. 9th, Mich., 2. 10th, Col.; N. M. 11th, Ariz.; Idaho; M. Ty.; Nev.; Utah. 12th, Ariz.; Utah, 2. 13th, Ill.; Kan., 2; Mich.; Mo.; Neb., 3. 14th, Md., 2; Penn.; Texas. 15th, N. J., 2; Utah, 17th, Or.; Utah. 18th, Ind. Ty.; La., 2; Miss.; Or.; Texas; Utah. 19th, Ark.; Ill., 2; Ind. Ty., hail; Kan., 5; Or. 20th, Ind.; Iowa, 2; Mich.; Miss., 2; Mo.; Ohio; Wis., 2. 21st, Ark.; Ind.; Ky.; La.; Or.; Tenn., 2; Texas. 22nd, Ala.; Ohio, 2; Penn., 2; Tenn., 2. 24th, Tenn. 25th, Me. 26th, Wis. 27th, Ind.; Kan.; Ky.; Mich., hail, 6; Ohio, 3; Texas; Wis. 28th, Cal.; Ill., hail, 4; Ind., 7; Iowa; Mich., hail, 4; Ohio, 10; Penn., 2. 29th, Ill., 4; Ind., 5; Iowa, 2; Ky., 2; Ohio. 30th, Ill., 2; Ind.; Kan.; Mich. 31st, Ill., 6; Ind., hail, 2; Iowa, 3; Kan., hail, 8; Mich., hail, 4; Mo.; N. Y., 2; Ohio, 2; Texas; Wis., 2.

*Auroras.*—5th, Lunenburgh, Vt. 6th, Vevay, Ind.; Strafford, Vt. 8th, Spiceeland, Ind. 9th, St. Paul, Minn. 10th, Monticello, Iowa; Woodstock, Vt.; Buffalo and Malone, N. Y.; Bismarek and Pembina, Dak.; Duluth and St. Paul, Minn.; Port Huron, Mich. 11th, Afton, Iowa; Toledo, Ohio. 12th, Auburn, N. H. 13th, Rockford, Iowa. 16th, Malone, N. Y. 17th, Ft. Brady, Mich.; Buffalo, N. Y. 18th, Nora Springs, Iowa; Vallecitas, Cal. 19th, Lunenburgh, Vt. 20th, Malone, N. Y. 25th, Rocky Run, Wis. 26th, N. Y. City.

## OPTICAL PHENOMENA.

*Solar Halos.*—1st, Kan. 2nd, Tenn. 3rd, Ohio; Tenn. 4th, Kan.; Ohio; Wis.; Ill.; Col.; R. I. 5th, Ill.; Me.; Ohio; S. C.; Mich.; N. H. 6th, Tenn.; S. C.; Wy. Ty.; Col.; N. C. 7th, Ga.; N. C.; Tenn. 8th, Md.; Tenn.; N. J. 9th, Ill.; N. Y.; Va.; N. J.; Tenn. 10th, Col.; Del.; Mass.; N. Y.; Va.; N. J.; N. C.; R. I.; N. H. 11th and 12th, N. Y. 13th, Iowa; Kan.; Mich.; N. H.; Minn.; N. Y. 14th, La.; Miss. 16th, Wy.; Col.; N. Y.; Cal. 17th, Ga.; Iowa. 19th, Ohio. 20th, Me.; Mass.; N. H.; R. I. 21st, Mich.; R. I. 23rd, Cal. 25th, Neb.; Wis.; Minn. 26th, Tenn.; Cal. 27th, Ill.; Iowa; N. C.; Tenn.; Wis.; Col. 28th, Ill.; N. Y.; Ohio; Tenn. 29th, Tenn.; N. Y. 30th, Ill.; N. H.; Tenn.; N. Y. 31st, Tenn.

*Lunar halos.*—1st, Iowa, N. Y., Ohio, Wis., Conn., N. C.; 2nd, Ill., Iowa, N. Y., N. C., Tenn., Ala., Conn., Penn., Mo., Or.; 3rd, Iowa, Dak.; Fla., Penn., Ala., Conn., N. C., Ohio; 4th, Col., Iowa, Neb., Ohio, N. C., D. C.; 5th, Me., Miss., N. H., N. Y., Ohio, Tenn., Ala., D. C.; 6th, Ga., N. C., S. C., Tenn., Me., Ala., N. M.; 7th, Ga., N. C., Tenn., Va.; 8th, Ill., N. C., N. J.; 9th, N. J., Va.; 10th, Ga., Ky., N. Y., W. Va., D. C.; 12th, Ill.; 16th and 17th, Ill.; 18th, Ky.; 21st, Ky., Tenn.; 24th, Ky., Neb., Me., Mo., N. C., N. J.; 25th, Ill., Mo., N. C.; 26th, Iowa, N. H., Wis., Minn., N. C.; 27th, Ill., Iowa, Mass., Mich., N. H., N. Y., Ohio, Penn., Tenn., Wis., Dak., Me., Ind., Conn., N. M., La., N. C.; 28th, Ill., Ind., Mass., Ohio, Tenn., Dak., Me., Ky., Ala., N. C.; 29th, Iowa, N. Y., Ohio, Tenn., Ga., Kan., Me., Ind. Ty., Ala., Mo., N. C.; 30th, Col., Ill., Tenn., Ind. Ty., Ala., Conn., Mo., N. C., R. I.; 31st, Ill., Mich., Neb., N. J., Ohio, Tenn., Ind. Ty., Ind., Ala., La., N. C., Miss.

*Mirage.*—Fort Yuma, Cal., 6th; Golden, Col., 25th; Great Bend, Kan., 1st, 6th, 15th, 23rd, 24th and 25th; Sedgewick, Kan., 23rd; Breckenridge, 13th, 15th and 16th; New London, 13th and 19th.

## MISCELLANEOUS PHENOMENA.

*Zoological.*—*Wild Geese* were observed flying SW. at Cincinnati on the 31st; Charleston, S., 14th; Corsicana, S., 12th and 13th; Breckenridge, S., 7th; Dubuque, S., 11th and 13th; Fort Gibson S., 10th, 14th and 30th; Morgantown, S., 27th; Shreveport, S., 13th; Sandy Hook, S., 14th; Washington, S., 4th and 10th, E., 14th; Fort Randall, Dak., S., 3rd and 21st; Lower Brule Agency, Dak., S., 19th and 25th; Fort Hartuff, Neb., S., 27th; Carbondale, Ill., SW., 4th; Laconia, Ind., S., 12th; St. Meinrad, Ind., S., 14th; Wabash, Ind., S., 25th; Afton, Ia., S., 3rd and 12th; Monticello, Ia., S., 11th; Le Roy, Ks., S., 3rd; Great Bend, Ks., S., 20th; Bennettsville, Ky., S., 14th; Somerset, Mass., S., 12th; Fall River, Mass., S., 31st; Brookhaven, Miss., S., 16th; Portsmouth, Neb., S., 1st; Carson City, Nev., S., 12th and 13th; Waterburgh, N. Y., S., 28th; Palermo, N. Y., SW., 11th; Attaway Hill, N. C., S., 12th and 13th; Bellefontaine, O., S., 31st; Carthagena, O., S., 7th and 14th; Jacksonburgh, O., S., 11th; Tioga, Pa., S., 22nd; Franklin, Pa., SE., 30th; Emporium, Pa., S., 8th and 14th; Belmont Farm, Tex., S., 3rd, 8th and 21st; Gilmer, Tex., S., 4th; Kanab, Utah, S., 2nd; Prospect Hill, Va., 13th; Acotink, Va., S., 11th; Embarrass, Wis., S., 9th, 10th and 11th; Wautoma, Wis., 16th; Utica, Wis., S., 9th, 17th and 18th. *Wild Ducks*, flying N., at Nashville, 4th; Cape Hatteras, S., 28th; Fort Brady, Mich., S., 6th; Golden, Col., SE., 12th; Fort Madison, Ia., N., 16th; Jacksonburgh, O., S., 27th; Monticello, Ia., 24th. *Brants*, seen at Fort Madison, Ia., 1st and 11th; abundant at Great Bend, Kan., 12th. *Cranes*, seen at

Fort Madison, Ia., 24th; flying S. at Breckenridge, 7th; Le Roy, Kan., S., 12th; Great Bend, Kan., S., 18th; Belmont Farm, Tex., S., 13th. *Snowbirds*, seen at Eastport, 8th; Bethel, O., 27th and 28th. *Blackbirds*, seen at Wautoma, Wis., 25th; flying south at Dubuque, 22nd; Palermo, N. Y., southwest, 7th. *Bluebirds*, flying south, at Monticello, Iowa, 9th; Wappinger's Falls, New York, large flocks south, 1st. *Swallows*, last seen at Carthagena, O., 3rd. *Robins*, last seen at Tioga, Pa., 20th; West Charlotte, Vt., 19th; numerous at Stratford, Vt., 17th. *Meadow Larks*, seen at Wautoma, Wis., 15th. Charleston, S. C., visited by several species of strange birds on 31st. *Grasshoppers* were reported numerous at Cincinnati on the 22nd; a few flying S. E. at Cheyenne, 3rd; numerous at Corsicana, 3rd to 5th, disappearing about 9th; abundant at Belmont Farm, Tex., 1st to 9th; numerous and destructive at times during month at LeRoy and Baxter Springs, Kan.; reported nearly all gone at Creswell, Kan., 19th, and Council Grove, Kansas, 31st; flying N. E. at Golden, Col., 2nd; summit of mountains near Denver covered with many thousand bushels of dead grasshoppers.

*Meteora*.—6th and 7th, Waterburgh, N. Y. 8th, Somonauk, Ill.; Standish, Me.; Somerset, Boston and Wilmot, Mass.; Brookhaven, Miss.; Westminster, Vt.; New London, Conn. 9th, Wabash, Ind. 10th, Monticello, Iowa; Great Bend, Kan.; Benettsville, Ky.; La Crosse, Wis. 11th, Gardiner, Me.; Woodstock, Md.; Buffalo, N. Y. 12th, Woodstock, Md. 13th, Woodstock, Md.; Florida, Mass. 14th, Mayport, Fla.; Afton and Davenport, Iowa; Corning, Mo.; Cape Lookout, N. C. 15th, Wabash, Ind. 16th, Monticello, Iowa; Woodstock, Md.; Brookhaven, Miss.; Corning, Mo.; Freehold, N. J. 17th, Wabash, Ind.; Florida, Mass. 18th, Durham, Ark.; Benettsville, Ky.; Woodstock, Md.; Northport, Mich.; Waterburgh and Hector, N. Y.; Salem, West Va.; Indianapolis, Ind. 19th, Woodstock, Md.; New Bedford, Florida and Fall River, Mass.; Urbana and Wooster, Ohio; Westminster, Vt.; Wautoma, Wis.; N. Y. City; Newport, R. I. 20th, Golden, Col.; Woodstock, Md.; Waterburgh, N. Y.; New London, Conn. 21st, Golden, Col.; Wabash, Ind.; Benettsville, Ky.; Mt. Auburn, Ohio; Jacksonville, Fla. 22nd, Corning, Mo.; Charleston, S. C. 23rd, St. Louis, Mo. 24th, Golden, Col.; Afton, Iowa; Benettsville, Ky.; Springfield, Mass. 25th, Monticello, Iowa; 26th, Standish, Me. 27th, Fall River and Springfield, Mass. 28th, Wabash, Ind.; Fall River, Mass.; Emerson, Neb. 29th, LeRoy and Great Bend, Kan. 30th, Somonauk, Ill.; Jacksonville, Fla.; St. Louis, Mo. 31st, Aiken, S. C.; Augusta, Ga.

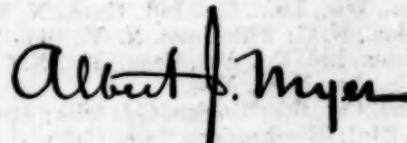
*Earthquakes*.—Severe shock felt at San Francisco, 9:20 p. m. 6th, lasting about ten seconds, motion from NW. to SE.; a second and lighter shock at 10:8 p. m. same day. The former was also felt at Oakland, San Jose and Angel Island, Cal., with an oscillatory motion.

*Prairie Fires*.—Seen from Pike's Peak, 1st, 28th; Pembina, 1st, 14th, 15th, 22nd, 23rd, 24th, 25th, 26th, 30th; Creswell, Kan., 5th, 29th; Lake Charles, La., 8th, 14th; Breckenridge, 8th, 9th, 14th, 15th, 16th, 17th, 18th, 19th, 27th, 31st; Bismarck, 9th, 13th, 28th, 29th, 30th, 31st; Lower Brule Agency, Dakota, 15th; in West Township, McLean co., Ill., 1,000 acres burned over, 400 acres of corn destroyed. 19th; Genoa, Neb. (S. and W.) 31st.

*Ice-bergs*.—Lat.  $45^{\circ} 42' N.$ , long.  $49^{\circ} 13' W.$ , 1st;  $46^{\circ} 10' N.$ ,  $50^{\circ} W.$ , 4th.

*Polar Bands*.—Wis., Milwaukee 1st. Ohio, Carthagena, 3rd, 5th, 13th, 16th, 18th, 21st. Va., Wytheville, 7th. Ky., Benettsville, 7th, 8th. D. C., Washington, 8th. Iowa, Guttenberg, 8th, 16th; Iowa City, 8th, 17th; Nora Springs, 8th, 26th; Tabor, 28th. Miss., Fayette, 20th, 23rd. N. J., Freehold, 29th. Tenn., Nashville, 29th.

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Brig. Gen. (Bvt. Asstg'd.) Chief Signal Officer, U. S. A.

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